Strain Sensors

DA40, DA54, DAdx, DA115Clip, DA120Clip

Last update: 02.01.07

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Strain Sensors DA40 and DA54

Measurement range: ±0.1 µm/m to ±1000 µm/m

	DA40	DA54-PUR	DA54-M12
Illustration			
Dimensions	40mm x 26mm x 10mm	54mm x 30mm x 20mm	54mm x 30mm x 20mm
Cable	5m 4x0.14, Ø3mm	5m 2x2x0.25, Ø6mm	built-in jack M12 type 763 spring contact

Accessories	Illustration
Adhesive EPY 150 (included in delivery)	
Adhesive M-Bond 30 (optional)	
Filling gun (optional)	

Description

The areas of application for the strain sensors DA40 and DA54 are the high-resolution acquisition of forces and deformations on massive components e.g. of presses, lifting tools, tanks, steel supports, bridges as well as on connecting rods or pedestals of production machines.
The retrospective installability make these strain sensors into universal, retro-fittable sensors for monitoring force and load. These strain sensors are durable and resistant to oil and moisture.

The most favorable installation position is lateral to the direction of loading. The forces are then transmitted through the housing. Up to an strain of 1000µm/m, however, assembly longitudinal to the direction of the stress is possible without any limitation in the accuracy.

The strain sensors DA40, DA54 and DadX are excellently suited for static and dynamic measurements.

The strain sensors DA40 and DA54 only differ from each other in their dimensions and the fasteners (M4 or M6).

The strain sensors DadX consist of two half-shells, which are mounted on pillars. They are available for diameters from 50mm to 250mm.

The sensor DA54 is also available without a sink for mounting with concealed studs.

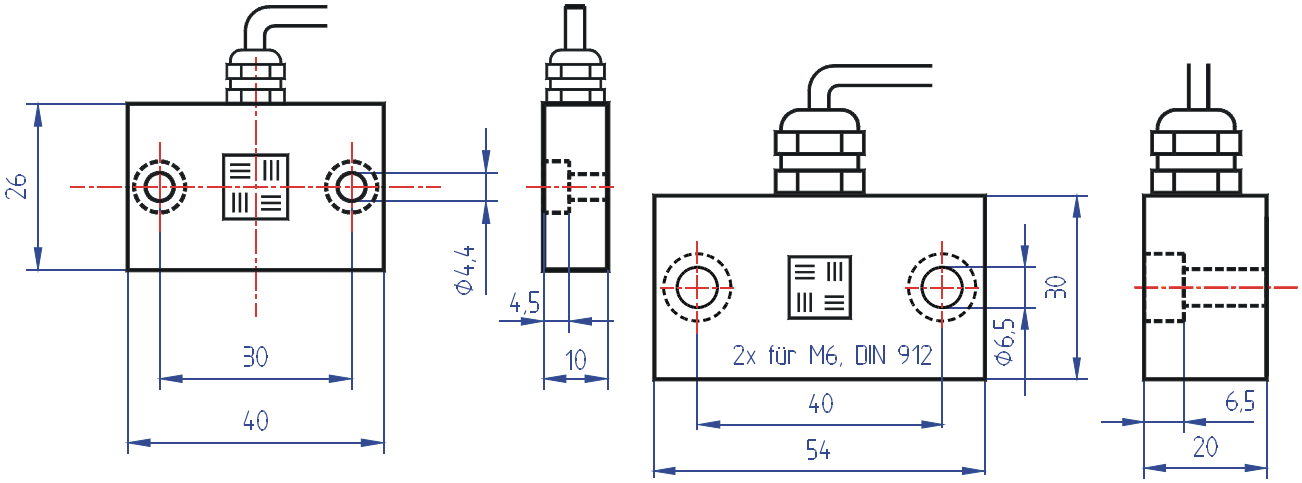
The same performance features are achieved with these strain sensors in their robust and installation-friendly aluminum housing as with the direct application of strain gages . This includes a high resolution, very low drift symptoms and the possibilities for both static and dynamic measurement.
The strain sensor contains a completely wired strain gage, which, when the strain sensor is being screwed on, is pressed on the component to be glued by a specially shaped pressing mechanism. The housing serves as a mounting frame for the strain gage application.

The surface of the component must be ground and cleaned before screwing on the strain sensor in the area of the strain gage. The strain gage is permanently protected against moisture by means of a special, oil-resistant seal.
The null balancing of the strain gage is carried out after the installation of the strain sensor by the strain gage measuring amplifier GSV-2. strains from 0.1µm/m onwards can be displayed. This corresponds to a mechanical stress of about 0.02N/mm^2 on a component surface of steel. With the combination of strain sensor and measuring amplifier GSV-2, switching thresholds from about 1µm/m (corresponding to 0.2N/mm^2) onwards can be monitored, if a null balancing is carried out periodically.
For applications in weighing technology, an strain range of at least 30µm/m (6 N/mm^2) is recommended, in order to achieve as low a drift as possible.

Dimensions

DA40

DA54



positive strain: <-->

Technical Data

Strain senor	tension / compression	
Length × width × height	40 × 26 × 10 or 54 x 30 x 10	mm × mm × mm
Fastening of strain gage	adhesive sealing	
Fastening of housing	2 × for M4 or M6 DIN 912	
Material of housing	aluminum	
Measurement range (ε_N)	±0,1 ... ±1000	µm/m
Input resistance	350 ±0,7	Ohm
Output resistance	350 ±0,7	Ohm
Insulation resistance	> 5 · 10^9	Ohm
Supply voltage	2.5…10	V
Connection, 4-conductor	5	m

Pin configuration

		DA40	DA54	
+U_S	positive bridge supply	red	brown	
-U_S	negative bridge supply	black	white	shield: transparent
+U_D	positiver bridge output	green	green	
-U_D	negative bridge output	white	yellow	

Optional: flange jack (spring contact)	**pin number**	**ME cabel**	**ME cabel**	**763**	**designation**
(top view)	1	brown (+pink)	red	brown	+ supply (+U_S)
	2	white (+gray)	black	white	- supply (-U_S)
	3	green	green	blue	+ signal (+U_d)
	4	yellow	white	black	- signal (-U_d)

Strain Sensor DAdX

Measurement range: ±0.1 µm/m to ±1000 µm/m

Description

The two half-shells of the strain sensor DAdX are mounted on pillars to measure the compressive force of e.g. punches or the pretensioning force of tools. This strain sensor is suitable, like the DA40 and DA54, for both static and dynamic force monitoring.

As the strain sensor can be installed afterwards, it is a universal, retrofit sensor for monitoring force and load. The strain sensor is durable and resistant to oil and moisture.

This strain sensor with aluminum half-shells achieves the same performance as the direct application of strain gages. This includes high resolution and low drift. Every half-shell contains a completely wired strain gage full bridge, which is pressed and glued on the corresponding component by a special pressing mechanism, when the strain sensor is being screwed on. The housing serves as a mounting frame for the strain gage application. Possible bending forces in the column are compensated by parallel connection of the two strain gage full bridges.

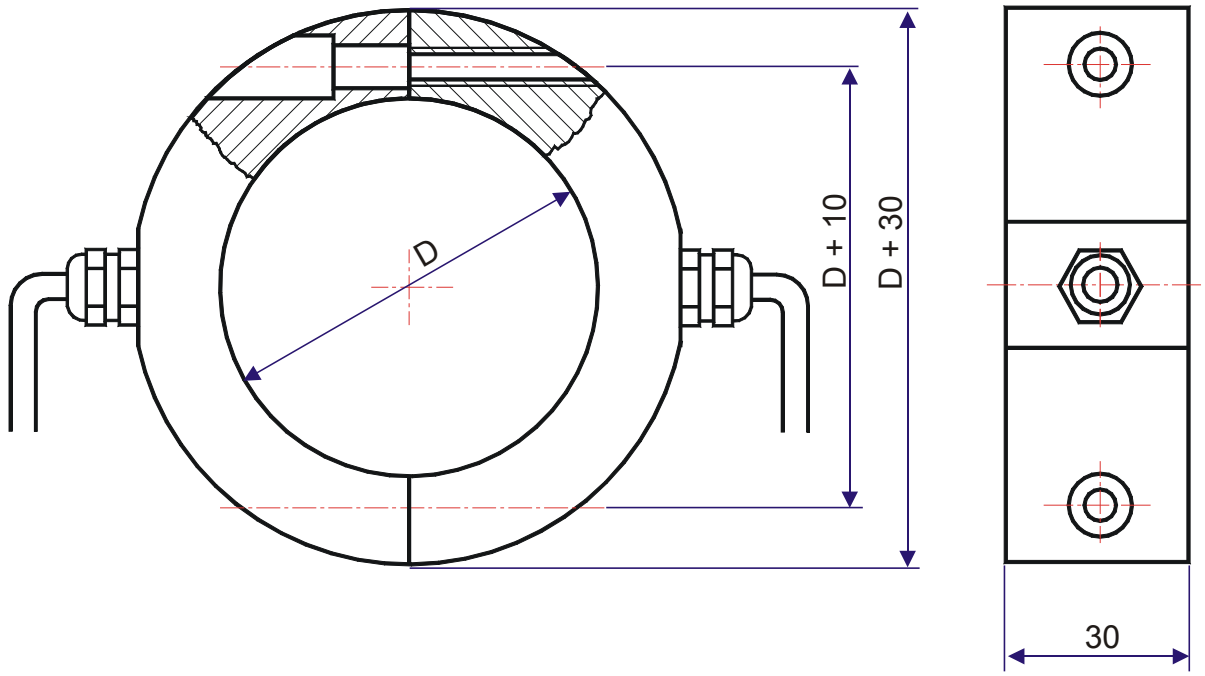
Individual versions of the half-shells, e.g. with strain gage half-bridges in 90°-arrangement or with strain gage half-bridges for the torque measurement are possible.

Before screwing on the strain sensor, the surface of the component must be ground and cleaned in the zone of the strain gage. The strain gage is durably protected against moisture by a special, oil-resistant seal.

The zero balancing of the strain gage is carried out after the installation of the strain

sensor by the strain gage measuring amplifier GSV-2 or GSV-1. Strains from 0.1µm/m onwards can be displayed. This corresponds to a mechanical stress of about 0.02N/mm^2 on a component surface of steel. With the combination of strain sensor and measuring amplifier GSV-2, switching thresholds from about 1µm/m onwards (corresponding to 0.2N/mm^2) can be monitored, if a zero balancing is carried out periodically.

Dimensions



Technical Data

Strain sensor	tension / compression	
Outer diameter x length	(inner diameter+30) x 30	mm × mm
Fastening of strain gage	Adhesive	
Fastening of housing	2 × M6	mm
Material of housing	aluminum	
Measurement range (ε_N)	±0.1 ... ±1000	µm/m
Input resistance	175 ±0.7	Ohm
Output resistance	175 ±0.7	Ohm
Insulation resistance	> 5 · 10^9	Ohm
Supply voltage	2.5…10	V
Connection, 4-conductor	10	m

Pin configuration

+U_S	positive bridge supply	brown	
-U_S	negative bridge supply	white	shield: transparent
+U_D	positive bridge output	green	
-U_D	negative bridge output	yellow	

All individual conductors are connected in parallel to compensate bending stresses.

Installation instructions for DA40, DA54 and DAdX

Preparing the surface

The strain sensors DA40, DA54 and DAdX should be installed on a surface of metal, on which any existing paint should be removed with a belt or fan grinder.

When using a belt or fan grinder, a granulation of 120 is sufficiently fine. Subsequently, the surface must be worked on manually with a granulation of 240.

There must be no striations in the zone of the strain gage. An abrasive cutting machine is not suitable for surface preparation!

Free the ground surface completely of grinding dust with a lint-free cloth and some solvent, e.g. Acetone, MEK (methyl ethyl ketone) or isopropyl alcohol.
Please ensure that you always use a clean cloth and begin at the border of the application surface. Grease must be wiped out of the application area. Back and forth movement does not have any effect, particularly at the end of the cleaning, since the grease is only moved from one place to another.
Cotton buds are recommended for the final cleaning, so that unintentional insertion of grease from the uncleaned border areas is avoided.
Now, do not touch the application area any more, and protect it from any contamination.

Mixing the glue

Please remove the clip that separates the hardener from the resin. Knead the bag till the resin and the hardener are thoroughly mixed and have a uniform color. Pay attention to the corners of the bag while mixing. The mixing process takes about three minutes. The work life after the mixing is about 30 to 60 minutes, depending on the ambient conditions.

Preparing the strain sensor

Take the strain sensor out of the package and remove the protective cover. Do not touch the strain gage with your fingers.

Gluing process

Carefully apply the glue with a spatula, a wooden stick, a toothpick or something similar in a thin, just about closed layer on the strain gage and the overlapping surface of the pressing pad.

Do not spread the adhesive on the seal.

Put on the strain sensor and screw it immediately.
Tighten the screws alternately, and at the same time pull the strain sensor against the screw heads until the strain sensor is cleanly in contact.
The pressing pad with the strain gage should not, as far as possible, be stressed by shearing.

From now on, the screws may not be loosened any more, since the strain gage might otherwise get damaged. In the case of the DA40, the screws should be tightened once again after 5 minutes as the seal will have been settled.
After a hardening time of about 12 hours (EPY150 at 22°C) or 30 minutes (M30 at 22°C), the sensor is ready for use without any restriction.

Function check

Already when the adhesive has not hardened completely, the basic functioning can be checked by connecting the supply voltage U_S and measuring the zero signal at the bridge output U_D. The signal should not be greater than 2 mV per V supply voltage.

A load test can also be carried out. However, depending on the amount of loading, you will find a low to significant creep, i.e. the displayed measurement reduces with time.

The insulation resistance between one of the connecting cables and the component should be at least 20MOhm, better 2GOhm.
The resistance between $+U_S$ and $-U_S$ is 350 Ohm.
The resistance between $+U_D$ and $–U_D$ is also 350 Ohm.

Cable

As connecting cable a 6mm PUR cable is used. It conforms to the EG low voltage directive 73/23/EWG. Temperature range is -40°C to 70°C moved and -50°C to 70°C unmoved. The minimum bending radius is approx. 5 times the cable diameter unmoved and 10 times cable diameter moved.

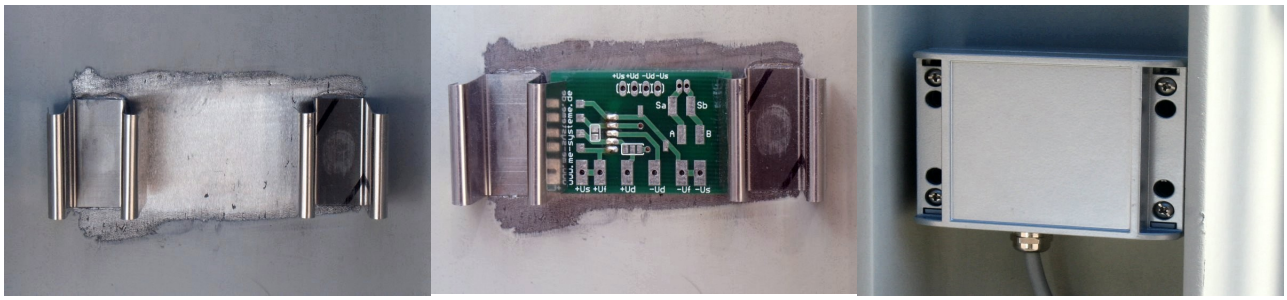
Pin configuration

Suitable for tension / compression, bending, shearing and torsion stress

		DA40	DA54	
$+U_S$	positive bridge supply	red	brown	
$-U_S$	negative bridge supply	black	white	Shield: transparent
$+U_D$	positive bridge output	green	green	
$-U_D$	negative bridge output	white	yellow	

DA120Clip

Strain gage application in a few minutes
Precise measurement under rough conditions



Description

The "DA 120 clip" system enables a quick, easy and IP 65 protected strain gage application. The system is composed of a carrier PCB, a diecast housing and two installation clips.

Advantages

Time-saving installation

The adhesive technique saves elaborate tapping on steel beams and also the time-consuming wiring and sealing of the strain sensor. The integrated wiring layout and the particularly large soldering terminals make a fast and secure installation under field conditions possible. Installation time can be under 10 minutes.

Reactionless installation

Special, patented installation clips prevent retroaction on strain gage measurement and fix at the same time carrier PCB and housing.

Mechanical protection against environmental impact

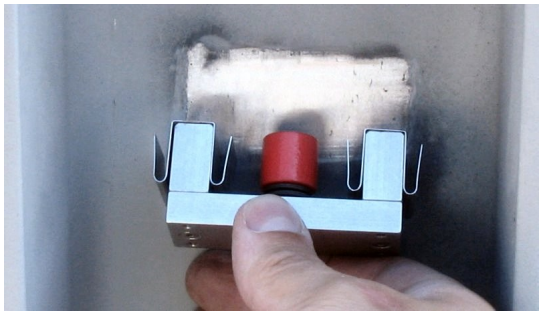
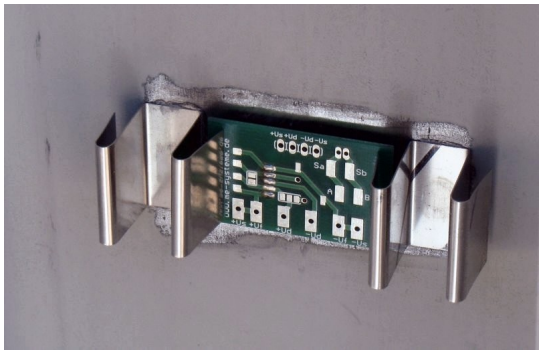
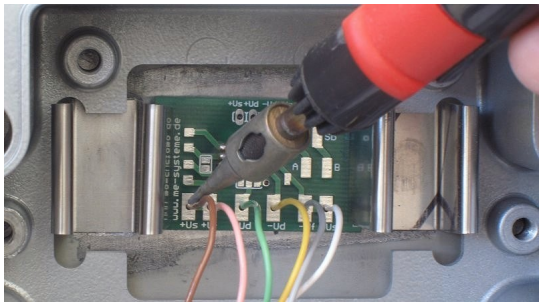
The IP 65 aluminum diecast housing with integrated strain relief ensures the necessary protection under difficult ambient conditions.

Ideal for security relevant components

No drillings are necessary, thus the sysem is apt for highly dynamicly charged components where no notch effects are allowed to exist (e.g. railroad tracks).

Applications

Rails / tracks
Crane / maschine building

	Surface preparation: **(1 minute)** Removal of varnish and anticorrosive with a belt grinder.
	**Gluing of the installation clips** **(1 minute)** The installation clips are glued directly to the medium by a special adhesive. With help of the magnetic tool the clips can be positioned optimal. During cure time (10 minutes) further clips can be applicated.
	**Gluing of the strain sensor** **(1 minute)** The strain sensor PCB is spread with special adhesive and the strain sensor can then directly be snapped into the installation clips.
	**Fastening of the housing** **(1 minute)** The back side of the diecast housing is spread with silicone as a waterproof sealing. The hosuing is then shifted onto the installation clips until these lock in. Thereby the housing is fixed. **Wiring** **(4 minutes)** The wiring map on the inside of the housing cover and the huge soldering terminals make wiring uncomplicated and trouble-free even under difficult conditions. With the cable conduit strain relief is achieved.

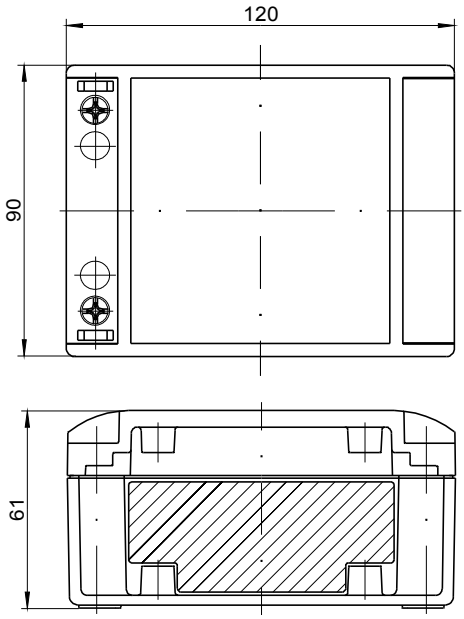
Technical Data

Strain sensor	tension / compression	
Length × width × height	120 x 90 x 61	mm × mm × mm
Fastening of strain gage	adhesive, with clip fit-up aid	
Fastening of housing	adhesive, with clip fit-up aid	
Material of housing	aluminum	
Measurement range (ε_N)	±0.1 ... ±1000	µm/m
Input resistance	350 ±0.7	Ohm
Output resistance	350 ±0.7	Ohm
Insulation resistance	> 5 · 10^9	Ohm
Supply voltage	2.5…10	V
Connection 4 or 6 conductor	connecting cable not included	

Pin Configuration

+U_S	positive bridge supply	red	brown	
-U_S	negative bridge supply	black	white	shield: transparent
+U_D	positive bridge output	green	green	
-U_D	negative bridge output	white	yellow	
+U_F	positive sense		pink	
-U_F	negative sense		gray	

Dimensions



Accessories

Tool with magnet; adhesive M-Bond 30; silicone Typ 732; connecting cable 3x2x0,25PUR;

Änderungen vorbehalten.
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